

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	10/726,341	Confirmation No.:	9027
Appellants	:	Philip C. Georgeau, et al.		
Filed	:	December 3, 2003		
TC/A.U.	:	3633		
Examiner	:	Jeanette E. Chapman		
Docket No.	:	CHE020 P304A		
Title	:	ROOFING SYSTEM AND METHOD		

APPEAL BRIEF (37 C.F.R. § 41.37(a))

Dear Sir:

This brief is in furtherance of the Notice of Appeal filed in this case on March 4, 2010.

Please charge Deposit Account No. 16 2463 for the balance of \$15 for the fee required under § 41.20(b)(2) (\$270 current appeal brief fee less \$255 paid for appeal brief on June 30, 2008). An extension for a period of one month in which to file an Appeal Brief is being filed concurrently herewith. If any additional fee is required, Appellants request that the fee(s) be charged to Deposit Account No. 16 2463.

This brief contains these items under the following headings, and in the order set forth below (37 C.F.R. § 41.37(c)(1)):

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3. U.S. Patent No. 4,996,812 Issued to Venable
4. U.S. Patent No. 5,737,897 Issued to Naipawer, III
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I. Real Party in Interest

The real party in interest in this application is Chem Link, Inc., a Michigan Corporation.

II. Related Appeals and Interferences

Appellants are aware of no other appeals or interferences that would directly affect or be directly affected by, or have a bearing on, the Board's decision in the pending appeal.

III. Status of Claims

Claims 1-27 are pending in the application. Claims 1-27 are rejected. This is an appeal of the rejection of claims 1-27.

IV. Status of Amendments

All amendments filed in this application are believed to have been entered.

V. Summary of Claimed Subject Matter

The present invention relates to a non-hazardous, environmentally friendly roof structure 2 (page 4, line 2) (Figs. 1 and 2) that may include a metal deck 3 (page 4, line 2) and a roof substrate such as a layer of insulation 4 (page 4, line 3). A moisture curing adhesive, such as a non-volatile polyether-based adhesive, is disposed on a portion of a first side 8 (page 4, line 5) of waterproof membrane 5 (page 4, line 3).

As discussed at page 4, line 17 – page 5, line 2, the moisture curing adhesive does not generate toxic vapors, and also does not require immediate application of the membrane as with existing two-part polyurethane foam sprayed systems. Furthermore, this adhesive can be used at temperatures below 40°, and it is not adversely affected by wind or the like during application. The adhesive develops tensile strength of about 200 lbs. per square foot, and therefore provides a very strong bond between the membrane 5 (page 4, line 3) and the roof the substrate 4 (page 5, line 1).

As discussed at page 8, lines 18-29, the moisture curing adhesive may also be utilized to bond insulation board to a fluted steel deck, and fiberglass reinforced gypsum board may be bonded to the insulation board utilizing the moisture curing adhesive. A waterproof membrane may then be bonded to the gypsum board using moisture curing adhesive. Test results show that this roof construction substantially exceeds roofing industry standards, and it provides a substantial improvement over prior polyurethane foam roof adhesive systems.

1. Independent Claim 1

One aspect of the invention, as recited in independent claim 1, is a roof deck structure 1 (page 4, line 1) for covering a roof substrate 4 (page 5, line 1). The roof structure includes a roof substrate 4 (page 5, line 1) having a sloped upper surface. A waterproof membrane 5 (page 4, line 3) has an upper side and a lower side that is substantially free of fleece material. The roof structure further includes moisture curing substantially non-volatile adhesive 7 (page 4, line 6) comprising a silyl-terminated polymer disposed on at least a portion of the lower side of the waterproof membrane 5 (page 4, line 3) in contact with the upper surface of the roof substrate 4 (page 5, line 1) and bonding the waterproof membrane 5 (page 4, line 3) to the roof substrate 4 (page 5, line 1) to define a portion of a low slope roof structure 2 (page 4, line 2) of a building structure. As discussed at page 4, lines 24-30, the adhesive 7 (page 4, line 6) has sufficient viscosity to form beads 11 (page 5, line 10) on the sloped upper surface (see also page 6, line 7).

2. Dependent Claim 3

Claim 3 depends from independent claim 1, and recites that the waterproof membrane 5 (page 4, line 3) comprises a layer of PVC material (page 5, line 29).

3. Independent Claim 5

Claim 5 recites a roof deck structure 1 (page 4, line 1) including a rigid low slope roof structure 2 (page 4, line 2) adapted to be supported at least in part by the walls of a building. The low slope roof structure 2 (page 4, line 2) has a roof substrate 4 (page 5, line 1) defining a sloped upper surface. A waterproof membrane 5 (page 4, line 3) has an upper side and a lower side. Moisture curing silyl-terminated polymer based adhesive 7 (page 4, line 6) is disposed on at least a portion of the lower side of the waterproof membrane 5 (page 4, line 3) in contact with the upper surface of the roof substrate 4 (page 5, line 1), and bonding the waterproof membrane 5 (page 4, line 3) to the upper surface of the roof substrate 4 (page 5, line 1). The

adhesive 7 (page 4, line 6) has sufficient viscosity to form beads 11 (page 5, line 10) upon extrusion (page 5, line 9) of the adhesive 7 (page 4, line 6) onto the sloped upper surface of the roof substrate 4 (page 5, line 1).

4. Dependent Claim 7

Claim 7 depends from claim 5, and recites that the waterproof membrane 5 (page 4, line 3) comprises a layer EPDM rubber that does not include fleece backing material.

5. Independent Claim 8

Independent claim 8 recites a roof deck structure 1 (page 4, line 1) including a rigid low slope roof structure 2 (page 4, line 2) including a roof substrate 4 (page 5, line 1) having a sloped upper surface. A waterproof flexible membrane 5 (page 4, line 3) covers the roof substrate 4 (page 5, line 1), and defines a lower surface. A moisture curing substantially non-volatile adhesive 7 (page 4, line 6) comprising a silyl-terminated polymer is in contact with the upper surface of the roof substrate 4 (page 5, line 1) and the lower surface of the flexible membrane 5 (page 4, line 3) to thereby bond the flexible membrane 5 (page 4, line 3) to the roof substrate 4 (page 5, line 1).

6. Dependent Claim 10

Claim 10 depends from claim 9. Claim 9 recites that the adhesive 7 (page 4, line 6) comprises a silyl-terminated polyether based adhesive, and claim 10 recites that the flexible membrane 5 (page 4, line 3) includes a layer of fleece mating 6 (page 4, line 4) on one side. Claim 10 further recites that at least a portion of adhesive 7 (page 4, line 6) is disposed in the fleece 6 (page 4, lines 4-5).

7. Dependent Claim 13

Claim 13 depends from independent claim 8, and recites that the flexible membrane 5 (page 4, line 3) is bonded to the roof substrate 4 (page 5, line 1) and has a bond strength of at least one hundred sixty-five pounds per square foot (page 8, line 27).

8. Dependent Claim 15

Claim 15 depends from claim 8, and recites that the roof substrate 4 (page 5, line 1) comprises fiberglass reinforced gypsum board (page 8, line 22).

9. Independent Claim 16

Claim 16 recites a roof deck structure 1 including a rigid slope roof structure 2 (page 4, line 2) including a roof substrate comprising fiberglass reinforced gypsum board (page 8, line 22). A waterproof flexible membrane 5 (page 4, line 3) covers the roof substrate 4 (page 5, line 1). A moisture curing substantially non-volatile adhesive 7 (page 4, line 6) is disposed between the roof substrate 4 (page 5, line 1) and the flexible membrane 5 (page 4, line 3) to thereby bond the flexible member 5 (page 4, line 3) to the roof substrate 4 (page 5, line 1). The roof deck structure 1 (page 4, line 1) includes a layer of foam insulation (page 8, line 20) below the fiberglass reinforced gypsum board (page 8, line 22).

10. Independent Claim 17

Claim 17 recites a roof deck structure 1 (page 4, line 1) including a rigid low slope roof structure 2 (page 4, line 2) including foam insulation 4 (page 4, line 3) forming a roof substrate. A waterproof flexible membrane 5 (page 4, line 3) covers the roof substrate 4 (page 5, line 1). A moisture curing substantially non-volatile adhesive 7 (page 4, line 6) is disposed between the roof substrate 4 (page 5, line 1) and the flexible membrane 5 (page 4, line 3) to thereby bond the flexible membrane 5 (page 4, line 3) to the roof substrate 4 (page 5, line 1). The roof deck structure further includes a fluted steel deck 3 (page 4, line 2) below the foam insulation 4

(page 4, line 3), and moisture curing adhesive 7 (page 4, line 6) bonding the foam insulation 4 (page 4, line 3) to the steel deck 3 (page 4, line 2) without the use of mechanical fasteners.

11. Independent Claim 21

Independent claim 21 recites a roof deck structure 1 (page 4, line 1) including fluted steel deck 3 (page 4, line 2) having a plurality of elongated upper deck surfaces. A substantially rigid panel (page 8, line 20) is disposed on the steel deck 3 (page 4, line 2). The panel defines upper and lower surfaces. Moisture-curing adhesive 7 (page 4, line 6) is disposed between the steel deck 3 (page 4, line 2) and the substantially rigid panel in contact with the upper deck surfaces and the lower surface of the substantially rigid panel (page 8, lines 20-21). A flexible waterproof membrane 5 (page 4, line 3) is disposed above the substantially rigid panel (page 8, line 20).

12. Dependent Claim 26

Claim 26 depends from claim 21, and recites that the waterproof membrane 5 (page 4, line 3) comprises a fleece-backed material (page 4, line 11).

13. Dependent Claim 27

Claim 27 depends from claim 21, and recites that the waterproof membrane 5 (page 4, line 3) comprises a fleece-backed PVC material (page 4, line 16).

VI. Grounds of Rejection to be Reviewed on Appeal

1. Claims 1-2 and 4-6 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Zenor, U.S. Patent No. 5,447,006, in view of Starr et al., U.S. Patent No. 5,895,536.
2. Claim 7 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Zenor, U.S. Patent No. 5,447,006, in view of Starr et al., U.S. Patent No. 5,895,536, and further in view of Venable, U.S. Patent No. 4,996,812.

3. Claim 3 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Zenor, U.S. Patent No. 5,447,006, in view of Starr et al., U.S. Patent No. 5,895,536, and further in view of Naipawer, III, U.S. Patent No. 5,737,897.
4. Claims 8-14, 17-22, and 26 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Venable, U.S. Patent No. 4,996,812, in view of Zenor, U.S. Patent No. 5,447,006, and further in view of Starr et al., U.S. Patent No. 5,895,536, and Van Wagoner, U.S. Patent No. 4,719,723.
5. Claims 15-16 and 23-25 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Venable, U.S. Patent No. 4,996,812, in view of Zenor, U.S. Patent No. 5,447,006, and further in view of Starr et al., U.S. Patent No. 5,895,536, Van Wagoner, U.S. Patent No. 4,719,723, and Beck, U.S. Patent No. 4,498,267.
6. Claim 27 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Venable, U.S. Patent No. 4,996,812, in view of Zenor, U.S. Patent No. 5,447,006, and further in view of Starr et al., U.S. Patent No. 5,895,536, Van Wagoner, U.S. Patent No. 4,719,723, and Naipawer, III, U.S. Patent No. 5,737,897.

VII. Argument

A. The References

1. U.S. Patent No. 5,447,006 in the name of Zenor.

Zenor '006 discloses a method for patching a single ply roof utilizing an NMP (N-methyl-2-pyrrolidone) solvent activator to bond a patch 12 (Fig. 3) to the upper (exposed) surfaces of existing roof membranes 34 and 36. At column 1, lines 18-25, Zenor '006 states that "[t]he sheets which form the membrane are secured to the insulation and the underlying roof deck at spaced locations by fastener assemblies which are spaced along the margins of the sheet. Each fastener assembly comprises a washer-like disc made of plastic or metal and

further comprises a screw adapted to thread into the roof deck to cause the disc to clamp the membrane downwardly against the insulation. Roofs of this type are known as single ply roofs.” (Emphasis added). At column 3, lines 19-28, Zenor ‘006 states “[t]his roof system is comprised of a roof deck 30, a layer of insulation 32, a first sheet of flexible roof membrane 34 and a second sheet of roof membrane 36 overlapping membrane 34 and secured thereto using an adhesive 38 or a known hot-air welding method or any other known suitable sealing method or material. Typically known fasteners are used on known centers, preferably with known sealants to secure the single ply membrane to the deck as required.” (Emphasis added). At column 4, lines 1-5, Zenor ‘006 discloses that the method includes wiping a coating of NMP solvent activator onto the cleaned upper surface 26 (or surfaces) that are to be seamed together.

2. U.S. Patent No. 5,895,536 in the name of Starr et al.

Starr et al. ‘536 discloses a method of adhering roof tiles 405 (Fig. 4), tiles 502 (Fig. 5), or tiles 602 (Fig. 6) utilizing a one-component adhesive foam. At column 4, line 65 through column 5, line 6, Starr et al. ‘536 states that “[i]n another important aspect of the present invention, the one-component adhesive foam is dispensed onto the roof substrate and roof tiles in a discontinuous pattern so that the adhesive foam does not substantially subdivide the undersurfaces of each roof tile into discrete areas to thereby partially cut off air circulation as can the continuous, linear deposits of adhesive foam described in the aforesaid ‘342 patent. The adhesive foam is further concentrated in deposits at opposing corners of the underside of the roof tile.” (Emphasis added). At column 5, lines 7-10, Starr et al. ‘536 states that “[t]he adhesive deposits of the present invention shall be aptly characterized in this detailed description as ‘pads’ or ‘pad-like’ deposits because they may comprise circular or irregular shapes, rather than comprise continuous or linear, longitudinal beads.” (Emphasis added). At column 7, lines 61-67, Starr et al. ‘536 discloses that the adhesive deposits 420 and 421 “do not subdivide the interstitial spaces occurring between the roof tiles and the roof substrate into discrete areas such as is taught

in the aforementioned U.S. Pat. No. 5,362,342 which division would restrict air and moisture flow therebetween.” At column 5, lines 44-47, Starr et al. ‘536 discloses that the Tile Bond™ adhesive is a one-component, high-density polyurethane adhesive foam that is a “minimal expanding foam.”

3. U.S. Patent No. 4,996,812 in the name of Venable.

Venable '812 discloses a method of membrane application in roof construction. A spray gun apparatus 16 (see Fig. 1) is used to apply a two-component polyurethane adhesive 15 that includes polyol and diisocyanate components that are mixed within the body of the gun and sprayed onto a substrate 10. A membrane 18 includes an EPDM rubber layer 20 and a non-woven polyester fleece layer 22. At column 5, lines 8-15, Venable '812 states:

[T]he foamed, cellular adhesive was [*sic*] good “breathing” properties, and this, combined with the vapor venting spacing provided between the adhesive and EPDM rubber, provides excellent venting of vapors. As a consequence, blistering is all but eliminated in the roofs of the present invention.

At column 1, lines 39-44, Venable '812 states “it is very difficult to properly bond the EPDM rubber directly with an adhesive, and accordingly the resultant roof is subject to wind uplifts. Secondly, such a construction provides little if any vapor ventilation capabilities, and thus such roofs are often prone to excessive blistering.”

4. U.S. Patent No. 5,737,897 in the name of Naipawer, III.

Naipawer, III '897 discloses an insulation board composite 1 “which is designed for peel and stick application onto a waterproofing membrane and mechanical fastening to a roof deck.” (Column 1, lines 64-67). A tacky, pressure sensitive adhesive coating 2 is applied onto the insulation board, and a releasable sheet 3 is applied over the adhesive. In operation, the composite is applied onto a roof deck and attached thereto. The release paper 3 is then removed and a waterproofing membrane is then secured to the adhesive layer 2. At column 1, lines 9-10,

Naipawer, III '897 states that "the insulation board is mechanically attached to a roof deck." (Emphasis added). At column 1, lines 22-25, Naipawer, III '897 states that "it is an object of this invention to provide an insulation board composite; mechanically fastened to a roof deck." (Emphasis added).

5. U.S. Patent No. 4,719,723 in the name of Van Wagoner.

Van Wagoner '723 discloses a membrane roofing system including a roofing membrane 26 (Fig. 1) on a concrete roof deck 16 as positioned both below a drainage course 42 and insulation panels 40. At column 7, lines 47-54, Van Wagoner '723 states that a moisture vapor barrier 44 "may be adhered between the drainage board 42 and the closed cell insulation 46 by conventional adhesive compositions." At column 4, lines 58-61, Van Wagoner '723 states that "[a]n external layer of aggregate, pavers or similar ballast is deposited on top of the insulation course of the panels to maintain the panels in position." At column 6, lines 20-27, Van Wagoner '723 states that:

A water impermeable roofing membrane 26 has been applied to the roof or deck surface 16 by a conventional technique such as multiple applications of felt paper and hot melt bituminous compound as outlined above or an elasto/plastic single ply membrane such as modified bituminous membranes, polyvinyl chloride, ethylene propylene diene monomer, etc.

6. U.S. Patent No. 4,498,267 in the name of Beck.

Beck '267 discloses a simulated clay tile roof construction including roof panel members 2 supported on a roof by screws 6 with furring strips 7 supported at rafter members 8. At column 1, lines 43-53, Beck '627 states that "[i]n order to minimize the cost of construction, while optimizing the strength and weight of roof panel members, a substantial portion of the area of the individual panel members is constructed of fiberglass reinforced gypsum, with only edge portions at raised simulated tile parts being of fiberglass reinforced plastic." The roof panel members 2 include cylindrically shaped, raised tile member portions 9 separated by flat portions 10. As shown in Fig. 1, the roof panel members 2 form an exterior layer of the roof construction.

B. Legal Considerations

Claims 1-2 and 4-6 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Zenor, U.S. Patent No. 5,447,006, in view of Starr et al., U.S. Patent No. 5,895,536; claim 7 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over Zenor, U.S. Patent No. 5,447,006, in view of Starr et al., U.S. Patent No. 5,895,536, and further in view of Venable, U.S. Patent No. 4,996,812; claim 3 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over Zenor, U.S. Patent No. 5,447,006, in view of Starr et al., U.S. Patent No. 5,895,536, and further in view of Naipawer, III, U.S. Patent No. 5,737,897; claims 8-14, 17-22, and 26 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Venable, U.S. Patent No. 4,996,812, in view of Zenor, U.S. Patent No. 5,447,006, and further in view of Starr et al., U.S. Patent No. 5,895,536, and Van Wagoner, U.S. Patent No. 4,719,723; claims 15-16 and 23-25 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Venable, U.S. Patent No. 4,996,812, in view of Zenor, U.S. Patent No. 5,447,006, and further in view of Starr et al., U.S. Patent No. 5,895,536, Van Wagoner, U.S. Patent No. 4,719,723, and Beck, U.S. Patent No. 4,498,267; claim 27 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over Venable, U.S. Patent No. 4,996,812, in view of Zenor, U.S. Patent No. 5,447,006, and further in view of Starr et al., U.S. Patent No. 5,895,536, Van Wagoner, U.S. Patent No. 4,719,723, and Naipawer, III, U.S. Patent No. 5,737,897.

With respect to obviousness, in proceedings before the Patent and Trademark Office the Examiner bears the burden of establishing a *prima facie* case of obviousness based upon the prior art. MPEP 2142; *In re Fritch*, 23 USPQ 2d 1780, 1783 (Fed. Cir. 1992). Appellants respectfully assert that the Examiner has not yet met her burden of establishing a *prima facie* case of obviousness with respect to the rejected claims.

In rejecting claims under 35 U.S.C. §103, it is incumbent upon the Examiner to establish a factual basis to support the legal conclusion of obviousness. *See In re Fine*, 837 F.2d 1071, 1073, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). In so doing, the Examiner must make the factual determinations set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 17, 148

USPQ 459, 467 (1966), viz., (1) the scope and content of the prior art; (2) the differences between the prior art and the claims at issue; and (3) the level of ordinary skill in the art.

Furthermore, “Rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *KSR Int’l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1741, 82 USPQ2d 1385, 1396 (2007) (quoting *In re Kahn*, 441 F.3d 977, 988, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006)). Also, “[A] patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.” *KSR* at 1741. Obviousness is then determined on the basis of the evidence as a whole and the relative persuasiveness of the arguments. See *Oetiker*, 977 F.2d at 1445, 24 USPQ2d at 1444; *Piasecki*, 745 F.2d at 1472, 223 USPQ at 788.

Also, “[i]t is impermissible within the framework of §103 to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art.” *In re Wesslau*, 353 F.2d 238, 241, 147 USPQ 391, 393 (CCPA 1965); see also *In re Mercier*, 515 F.2d 1161, 1165-66, 185 USPQ 774,778 (CCPA 1975). In a recent case (after *KSR*), the Court of Appeals for the Federal Circuit confirmed that it is improper to “pick and choose” certain elements from the prior art, stating that “[i]n addressing the question of obviousness a judge must not pick and choose isolated elements from the prior art and combine them so as to yield the invention in question if such a combination would not have been obvious at the time of the invention.” *Abbott Laboratories v. Sandoz, Inc.* 544 F.3d 1341 (Fed. Cir. 2008) (citing *Dennison Mfg. Co. v. Panduit Corp.*, 475 U.S. 809, 106 S. Ct. 1578, 89 L.Ed.2d 817 (1986)).

1. **Claims 1-2 and 4-6 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Zenor, U.S. Patent No. 5,447,006, in view of Starr et al., U.S. Patent No. 5,895,536.**

- a. **Claims 1-2 and 4**

As discussed above, independent claim 1 recites a roof structure including “moisture curing substantially non-volatile adhesive comprising a silyl-terminated polymer” that is disposed on at least a portion of a lower side of a waterproof membrane in contact with an upper surface of a roof substrate and bonding the waterproof membrane to the roof substrate.

Neither Zenor ‘006 nor Starr et al. ‘536 disclose “a moisture curing substantially non-volatile adhesive comprising a silyl-terminated polymer” as recited in claim 1, and no combination of these references could possibly anticipate claim 1. There is no evidence of record showing that the NMP solvent activator of Zenor ‘006 is a moisture curing adhesive, nor is there any evidence of record showing that the foam adhesive of Starr et al. ‘536 is a moisture curing adhesive. Still further, neither Zenor ‘006 nor Starr et al. ‘536 disclose an adhesive comprising a “silyl-terminated polymer” as recited in claim 1.

With respect to the adhesives of Zenor ‘006 and Starr et al. ‘536, Appellants note that “[to] establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.” MPEP 2112(IV), *citing In re Robertson*, 169 F.3d 743, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999) (quoting *Continental Can Co. v. Monsanto Co.*, 948 F.2d 1264, 20 USPQ2d 1746, 1749 (Fed. Cir. 1991)) (emphasis added). In the present case, there is no evidence of record showing that Zenor ‘006 or Starr et al. ‘536 disclose a “moisture curing substantially non-volatile adhesive comprising a silyl-terminated polymer” as recited in claim 1. As noted above, in proceedings before the Patent and Trademark Office, the Examiner bears the burden of establishing a *prima facie* case of obviousness based on the prior

art. *In re Fritch, supra*. Thus, Appellants do not have the burden of proving that the prior art could not possibly disclose a “moisture curing substantially non-volatile adhesive comprising a silyl-terminated polymer” as recited in claim 1.

Furthermore, the present invention solves long-standing problems encountered in low-slope roof construction. As discussed at page 1, line 9 through page 2, line 16 of the present application, wind acting on a building structure may cause a substantial uplift force acting on a roof membrane. This can cause the roof membrane to separate from the roof substrate, resulting in costly damage to buildings and the valuables in the buildings. Furthermore, some material and adhesive combinations do not provide a sufficient adhesive bond. It cannot be assumed that a given adhesive will provide an adequate adhesive bond with any material or combination of materials. For example, as stated at column 1, lines 39-42 of Venable ‘812, “it is very difficult to properly bond the EPDM rubber directly with an adhesive, and accordingly the resultant roof is subject to wind uplifts.” Providing a non-hazardous, environmentally friendly adhesive/roof structure that is also capable of meeting wind uplift requirements has been a long-standing problem that has not heretofore been solved. Accordingly, providing a roofing structure that works for its intended purpose requires more than simply utilizing a patent claim as a template to pick and choose the features from the prior art as required to meet claim limitations, while simultaneously ignoring the other teachings of the prior art and the large number of variables affecting adhesive bond strength for various construction materials.

There is no evidence of record that the polyurethane adhesive foam of Starr et al. ‘536 would provide adhesion between the patch 12 and existing roof membranes 34 and 36 of Zenor ‘006, even if such a combination were to be attempted. The roof tiles and underlayment 32 (column 3, lines 51-53 and column 7, line 34) of Starr et al. ‘536 are completely different materials than the chlorosulfonated polyethylene membrane 34 of Zenor ‘006 (column 3, lines 29-31). Given that the materials of Zenor ‘006 and Starr et al. ‘536 are completely different, the result of this combination is unknown, and not necessarily predictable. In

general, a specific adhesive will not necessarily adhere to all materials, and, conversely, a specific material will not necessarily bond with all adhesives. As noted above, Venable ‘812 states that “it is very difficult to properly bond the EPDM rubber directly with an adhesive.” (Column 1, lines 38-40). It is speculative to assume that the Starr et al. ‘536 adhesive would provide adhesion between the chlorosulfonated polyethylene membranes of Zenor ‘006.

Appellants note that “[i]n order to render a later invention unpatentable for obviousness, the prior art must enable one skilled in the art to make and use the later invention, as opposed to the prior art itself being enabling.” *In re Kumar*, 418 F.3d 1361, 76 USPQ2d 1048 (Fed. Cir. 2005) (emphasis added). Enablement requires more than the mere possibility that a proposed combination may or may not work for its intended purpose. Appellants reiterate that the burden of establishing a *prima facie* case of obviousness is on the Examiner. *In re Fritch, supra*. Appellants do not have to prove that a hypothetical combination of prior art references could not possibly work.

Still further, based on the evidence of record, it appears to be quite possible that the foam adhesive of Starr et al. ‘536 would outgas during curing, and this would likely cause substantial problems. Claim 1 recites “a waterproof membrane having an upper side and a lower side that is substantially free of fleece material.” (Emphasis added). If an outgassing foam adhesive were positioned between a non-fleece backed membrane and a roof substrate, it is quite possible that the outgassing would cause bubbles or blisters. Appellants note that Venable, U.S. Patent No. 4,996,812, teaches that fleece matting “makes it possible to fabricate the roof structure with a vapor venting spacing between the adhesive material and flexible membrane sheet.” (Column 1, lines 57-60) (emphasis added). Also, Starr et al. ‘536 does not disclose a way to provide an acceptably uniform layer of foam adhesive, but rather teaches applying the foam at corners of the roof tile. If the foam adhesive of Starr et al. ‘536 were to be positioned between a roof membrane “that is substantially free of fleece material” and a roof substrate as recited in claim 1, the expanding foam adhesive of Starr et al. ‘536 would likely cause the membrane surface to be uneven, with low spots that would collect water.

Still further, there is no evidence of record suggesting that one of skill in the art would construe the existing roof membranes 34 and 36 of Zenor '006 to be a "roof substrate having a sloped upper surface" as recited in claim 1. (Emphasis added). Appellants understand, of course, that claims are broadly construed during prosecution. However, even during prosecution claim terms cannot be construed in an unreasonable manner: "The broadest reasonable interpretation of the claims must also be consistent with the interpretation that those skilled in the art would reach." MPEP 2111 (emphasis added). MPEP 2111.01(I) states that "words of the claim must be given their plain meaning unless applicant has provided a clear definition in the specification." Furthermore "'plain meaning' refers to the ordinary and customary meaning given to the term by those of ordinary skill in the art." MPEP 2111.01(II).

The roofing membranes 34 and 36 of Zenor '006 are an upper surface of the Zenor '006 roof construction, and there is no evidence of record showing that one skilled in the art would consider the existing membranes 34 and 36 to be a "roof substrate" as recited in claim 1. At column 1, lines 17-26, Zenor '006 discloses "known fasteners" that are "used on known centers . . . to secure the single ply membrane to the deck." (Column 3, lines 26-29). Zenor '006 itself clearly does not consider the membranes 34 and 36 to be a "roof substrate."

In fact, Zenor '006 itself actually discloses using mechanical fasteners to retain a roof membrane to a roof substrate. Appellants reiterate that "[i]t is impermissible within the framework of §103 to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art." *In re Wesslau, supra*. The use of mechanical fasteners in Zenor '006 is directly contrary to the arrangement of claim 1.

b. Claims 5-6

As discussed above, independent claim 5 recites a roof deck structure including a rigid low slope roof structure and a waterproof membrane having upper and lower sides. Claim 5

further recites “a moisture curing silyl-terminated polymer based adhesive disposed on at least a portion of said lower side in contact with said upper surface of said roof substrate.” As discussed above in connection with independent claim 1, neither Zenor ‘006 nor Starr et al. ‘536 disclose a moisture curing silyl-terminated polymer based adhesive. Accordingly, no combination of Zenor ‘006 and Starr et al. ‘536 could possibly anticipate independent claim 5.

Furthermore, as discussed above, Zenor ‘006 actually teaches use of mechanical fasteners (screws) to secure the roof membrane to the roof substrate. Accordingly, Zenor ‘006 itself is directly contrary to the arrangement of claim 5.

Furthermore, as discussed in more detail above in connection with independent claim 1, there is no evidence of record establishing that the expanding foam adhesive of Starr et al. ‘536 would provide adhesion between the chlorosulfonated polyethylene patch and roof membranes of Zenor ‘006. Zenor ‘006 actually teaches a specific activator chemical (NMP) to bond two membranes of the same material.

Still further, the roof membranes 34 and 36 of Zenor ‘006 are not a “roof substrate defining a sloped upper surface” as recited in claim 5. Zenor ‘006 actually teaches adhering a patch membrane to existing membranes that are made of the same material as the patch membrane.

2. Claim 7 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Zenor, U.S. Patent No. 5,447,006, in view of Starr et al., U.S. Patent No. 5,895,536, and further in view of Venable, U.S. Patent No. 4,996,812.

As discussed above, claim 7 depends from independent claim 5. Accordingly, the rejection of claim 7 is believed to be improper for those reasons set forth above in connection with independent claim 5.

The Office Action dated December 4, 2009, states that “Venable discloses a roof structure for covering a roof substrate comprising . . . a waterproof membrane of EPDM rubber 18 having an upper side *and a layer of fleece material 22 disposed on the lower side of the membrane* . . . In view of the above it would have been obvious to include the fleece material to provide a

waterproof membrane having ventilation properties.” (Emphasis added). However, claim 7 recites that “said waterproof membrane comprises a layer of EPDM rubber that does not include fleece backing material.” (Emphasis added). Given that claim 7 recites that the membrane does not include fleece backing material, it is unclear why the Office Action asserts that it “would have been obvious *to include the fleece material* to provide a waterproof membrane having ventilation properties.” (Emphasis added). If anything, a need for ventilation properties suggests that it would not have been obvious to provide a waterproof membrane “that does not include fleece backing material” as recited in claim 7. (Emphasis added).

3. Claim 3 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Zenor, U.S. Patent No. 5,447,006, in view of Starr et al., U.S. Patent No. 5,895,536, and further in view of Naipawer, III, U.S. Patent No. 5,737,897.

Claim 3 depends from claim 1, and the rejection of claim 3 is therefore believed to be improper for those reasons set forth above in connection with independent claim 1. Claim 3 recites that “said waterproof membrane comprises a layer of PVC material.” Appellants respectfully assert that the references themselves do not teach that the expanding foam of Starr et al. ‘536 would provide adhesion if used with a PVC membrane. The roof tiles and underlayment of Starr et al. ‘536 are completely different materials from the PVC material of claim 3, and there is no reason (absent hindsight) to expect the foam of Starr et al. ‘536 to provide proper adhesion between a PVC membrane and a roof substrate as recited in claim 3.

Appellants reiterate that the Examiner bears the burden of establishing a *prima facie* of obviousness based upon the prior art. Restated, Appellants do not have the burden of proving that a hypothetical combination pieced together using a claim as a template would not result in a viable roof structure.

- 4. Claims 8-14, 17-22, and 26 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Venable, U.S. Patent No. 4,996,812, in view of Zenor, U.S. Patent No. 5,447,006, and further in view of Starr et al., U.S. Patent No. 5,895,536, and Van Wagoner, U.S. Patent No. 4,719,723.**

a. Claims 8-14

Independent claim 8 recites a roof deck structure including, among other features, a “moisture curing substantially non-volatile adhesive comprising a silyl-terminated polymer” that is in contact with an upper surface of a roof substrate and a lower surface of a flexible membrane to thereby bond the flexible membrane to the roof substrate. As discussed above in connection with independent claim 1, neither Zenor ‘006 nor Starr et al. ‘536 disclose a moisture curing substantially non-volatile adhesive comprising a silyl-terminated polymer. Furthermore, Venable ‘812 and Van Wagoner ‘723 also do not disclose any such adhesive. Venable ‘812 discloses a polyurethane foam system including diisocyanate and polyol components that are mixed in a gun 16 (column 4, lines 15-18). The two-part foam of Venable ‘812 is clearly not a “moisture curing substantially non-volatile adhesive comprising a silyl-terminated polymer” as recited in claim 8. Van Wagoner ‘723 also does not disclose any such adhesive. Thus, none of the cited references disclose the moisture curing adhesive of claim 8, and no combination of these references could anticipate claim 8.

With respect to the rejection of claims 8-14, 17-22, and 26, at page 5, the subject Office Action states that “[i]t is clear that if one used the moisture cured adhesive to bond the membrane to the foam substrate then one would also use the adhesive to bond the foam to the metal decking and to bond the foam to the fiberglass gypsum and to bond the fiberglass gypsum to the waterproof membrane in order to perverse the integrity of the roof deck. Venable does not show or disclose any mechanical fasteners.”

With respect to claim 8, at page 6, the subject Office Action states that “[i]n view of the above, it would have been obvious to modify Venable to include the recited material in order to employ readily available, common and workable materials of construction in order to [*sic*] and to

include the recited adhesive in order to provide shorter curing times which is also non-shrinking as taught by Starr et al. VW has been considered and applied to Venable as described above.”

Appellants reiterate that “rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness” and “a patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.” *KSR, supra*.

The subject Office Action does not provide the required “articulated reasoning with some rational underpinning” as required by *KSR*. Rather, the rejection of claim 8 is based on mere conclusory statements. There is no evidence of record establishing that there would be any reason whatsoever to utilize the expanding foam of Starr et al. ‘536 in Venable ‘812. It is unclear from the evidence of record what the result of such a combination would be, but it appears to be quite possible that the result would not be a working roof structure.

Furthermore, even if the materials disclosed in the references are “readily available, common and workable,” it does not follow that the results of combining individual parts of the references in entirely new combinations is necessarily predictable. Appellants assert that the results of combining the Starr et al. ‘536 adhesive with completely different materials of the other references are unknown, and not necessarily predictable. The U.S. Supreme Court has stated that the obviousness inquiry must “guard against slipping into use of hindsight and to resist the temptation to read into the prior art the teachings of the invention in issue.” *Graham v. John Deere Co.*, 383 U.S. 1, 36, 148 USPQ 459, 467 (1966). The conclusory nature of the rejection of claim 8 strongly suggests that the rejection is based on improper use of hindsight.

b. Claims 17-20

Independent claim 17 recites a roof deck structure including “a rigid low slope roof structure including foam insulation forming a roof substrate,” and a moisture curing substantially non-volatile adhesive disposed between the roof substrate and the flexible

membrane. Claim 17 further recites a fluted steel deck below the foam insulation, and moisture curing adhesive bonding the foam insulation to the steel deck without the use of mechanical fasteners.

With respect to the rejection of claims 17-19, at page 7, the subject Office Action states that “[i]t is clear that if one used the moisture cured [*sic*] adhesive to bond the membrane to the foam substrate then one would also use the adhesive to bond the foam to the metal decking and to bond the foam to the fiberglass gypsum and to bond the fiberglass gypsum to the waterproof membrane in order to preserve the integrity of the roof deck. Venable does not show or disclose any mechanical fasteners. Again the secondary references of DW and Starr et al. have been applied to the base reference in the same manner as described above.”

Neither Venable ‘812, Zenor ‘006, Starr et al. ‘536, nor Van Wagoner ‘723 disclose a moisture curing adhesive as recited in claim 17, such that no combination of these references could possibly anticipate claim 17.

Furthermore, the stated reason for combining Venable ‘812, Zenor ‘006, Starr et al. ‘536, and Van Wagoner ‘723 (“in order to preserve the integrity of the roof deck”), is clearly a conclusory statement, and the subject Office Action does not provide the required “articulated reasoning with some rational underpinning.” *KSR, supra*. Appellants reiterate that “a patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.” *KSR* at 1741. Even if the cited references did disclose the moisture curing adhesive of claim 17, this would not be sufficient to meet the Examiner’s burden of presenting a *prima facie* of unpatentability. There is no evidence of record establishing that the hypothetical combination of Venable ‘812, Zenor ‘006, Starr et al. ‘536, and Van Wagoner ‘723 would actually “preserve the integrity of the roof deck.”

Still further, Venable ‘812 does not disclose how or if insulated foam 14 (Fig. 3) is adhered to metal decking 12. The foam 14 closely follows the contour of steel deck 12, and this suggests that the foam 14 of Venable ‘812 is applied to the steel deck 12 in an uncured,

pourable form, whereby the foam 14 adheres to the steel deck 12 without use of a separate adhesive. Other than impermissible hindsight (*see, e.g., Graham v. John Deere Co., supra*), there would be no reason to assert that one skilled in the art would utilize moisture curing adhesive to secure the foam 14 to the steel deck 12 of Venable ‘812.

Also, the results of attempting to bond the Venable ‘812 foam to the steel deck are unknown, and not predictable. Appellants reiterate that the Examiner bears the burden of establishing a *prima facie* of obviousness based upon the prior art. Restated, Appellants do not have the burden of proving that a hypothetical combination pieced together using a claim as a template would not result in a viable roof structure.

c. Claims 21-22 and 26

As discussed above, independent claim 21 recites a roof deck structure including a fluted steel deck and a substantially rigid panel disposed on the steel deck. Claim 21 also recites “moisture-curing adhesive disposed between the steel deck and the substantially rigid panel in contact with the upper deck surfaces and the lower surface of the substantially rigid panel.”

With respect to the rejection of claim 21, at page 8, the subject Office Action states that “Venable discloses . . . moisture-curing adhesive 15 disposed between the steel deck and the substantially rigid panel in contact with the upper deck surfaces and the lower surface of the substantially rigid panel.” This is incorrect. Specifically, with respect to Fig. 3, the adhesive 15 of Venable ‘812 is disposed between foam 14 and membrane 18, not between the steel deck 12 and foam 14. Appellants assert that the membrane 18 of Venable ‘812 cannot constitute both a “flexible waterproof membrane” and a “substantially rigid panel” as recited in claim 21.

Absent impermissible hindsight, there would be no reason to expect one skilled in the art to utilize the expanding foam adhesive of Starr et al. ‘536 to bond the foam 14 of Venable ‘812 to the steel deck 12 of Venable ‘812.

Still further, the tiles and underlayment of Starr et al. '536 are completely different materials than the foam 14 and steel deck 12 of Venable '812. There is no evidence of record showing that the expanding foam of Starr et al. '536 would provide any benefit whatsoever in Venable '812, and it is not at all clear from the references themselves that such a combination would even produce a viable roof structure. As discussed at page 1, line 9 through page 2, line 16 of the present application, wind acting on a building structure may cause a substantial uplift force acting on a roof membrane, resulting in very costly damage to buildings and the valuables in the buildings. Providing a viable roofing structure requires more than simply utilizing a patent claim as a template to pick and choose the precise features of the prior art required to meet a claim limitation while completely ignoring the other teachings of the references and the large number of variables affecting adhesive bond strength for various construction materials. At page 8, line 10 through page 9, line 3, the present application discusses the results of wind uplift testing on a roof construction according to the present invention. The roof construction of the present invention provides very significant advantages over known roofing constructions.

Appellants assert that the results of the hypothetical combination of Venable '812, Zenor '006, Starr et al. '536, and Van Wagoner '723 are quite unpredictable, and there is no evidence that this hypothetical combination would result in a viable roof structure. Appellants reiterate that the Examiner bears the burden of establishing a *prima facie* of obviousness based upon the prior art. Restated, Appellants do not have the burden of proving that a hypothetical combination pieced together using a claim as a template would not result in a viable roof structure.

- 5. Claims 15-16 and 23-25 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Venable, U.S. Patent No. 4,996,812, in view of Zenor, U.S. Patent No. 5,447,006, and further in view of Starr et al., U.S. Patent No. 5,895,536, Van Wagoner, U.S. Patent No. 4,719,723, and Beck, U.S. Patent No. 4,498,267.**

a. Claim 15

As discussed above, claim 15 depends from claim 8, and recites that “the roof substrate comprises fiberglass reinforced gypsum board.” The rejection of claim 15 is believed to be improper for those reasons set forth above in connection with independent claim 8. Furthermore, the hypothetical combination of Venable ‘812, Zenor ‘006, Starr et al. ‘536, Van Wagoner ‘723, and Beck ‘267 is clearly the result of hindsight.

Furthermore, the rejection of claim 15 is based on an erroneous factual finding with respect to Venable ‘812. Specifically, at page 9, the subject Office Action states that “Venable however does teach a waterproof flexible membrane 18 covering said roof substrate 10; *a moisture curing substantially non-volatile adhesive 15* disposed between the roof substrate 10 and the flexible membrane 18 to thereby bond the flexible membrane to the roof substrate.” (Emphasis added). Venable ‘812 actually states that “the preferred adhesive 15 is a polyurethane foam system designed for bonding the described membrane to acceptable substrates. The diisocyanate and polyol components are mixed in gun 16.” (Column 4, lines 15-18). The diisocyanate and polyol two-part foam of Venable ‘812 is clearly not a “moisture curing substantially non-volatile adhesive comprising a silyl-terminated polymer” as recited in claims 8 and 15.

The subject Office Action is also unclear with respect to how Venable ‘812, Zenor ‘006, Starr et al. ‘536, Van Wagoner ‘723, and Beck ‘267 are being combined. At page 9, the subject Office Action states that Venable teaches that “the roof deck structure includes a layer of foam insulation 14 but not below the fiberglass reinforced gypsum board.” Given that Venable ‘812 does not disclose any substrate material other than foam insulation 14 and steel deck 12, it is unclear what is meant by “the fiberglass reinforced gypsum board.” Appellants can only guess

that the subject Office Action is asserting that the hypothetical combination being proposed includes substituting a fiberglass reinforced gypsum board in place of the foam 14 of Venable ‘812. However, the subject Office Action does not provide any reason whatsoever for such modification. Appellants again reiterate that rejections on obviousness grounds require that “there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness,” and that “a patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the art.” *KSR, supra*.

b. Claim 16

As discussed above, independent claim 16 recites a rigid low slope roof structure, including a substrate “comprising fiberglass reinforced gypsum board.” Claim 16 also recites a “waterproof flexible membrane” and “a moisture curing substantially non-volatile adhesive disposed between the roof substrate and the flexible membrane.” Claim 16 further recites that the roof deck structure “includes a layer of foam insulation below the fiberglass reinforced gypsum board.”

As discussed above, Venable ‘812 discloses a waterproof membrane 18, foam 14, and a steel deck 12. However, Venable ‘812 does not disclose any other layers of material. Given that Venable ‘812 does not disclose any other roofing layers, the hypothetical modifications proposed in the subject Office Action are clearly the result of impermissible hindsight. Furthermore, neither Venable ‘812 nor any of the other cited references disclose a “moisture curing substantially non-volatile adhesive” as recited in claim 16, such that no combination of Venable ‘812, Zenor ‘006, Starr et al. ‘536, Van Wagoner ‘723, and Beck ‘267 could possibly anticipate independent claim 16.

Furthermore, as discussed above, low slope roof structures are subject to substantial wind uplift forces. Providing a working roof structure requires more than simply utilizing a claim as a template to pick and choose the precise features of the claim while ignoring the other teachings of

the references. Also, Appellants reiterate that the Examiner bears the burden of establishing a *prima facie* of obviousness based upon the prior art. Restated, Appellants do not have the burden of proving that a hypothetical combination pieced together using a claim as a template would not result in a viable roof structure.

c. Claims 23-25

Claims 23-25 depend from independent claim 21, and the rejection of claims 23-25 is therefore believed to be improper for those reasons set forth above in connection with independent claim 21.

- 6. Claim 27 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Venable, U.S. Patent No. 4,996,812, in view of Zenor, U.S. Patent No. 5,447,006, and further in view of Starr et al., U.S. Patent No. 5,895,536, Van Wagoner, U.S. Patent No. 4,719,723, and Naipawer, III, U.S. Patent No. 5,737,897.**

a. Claim 27

Claim 27 depends from independent claim 21. Accordingly, the rejection of claim 27 is believed to be improper for those reasons set forth above in connection with independent claim 21.

C. Conclusion

For the reasons set forth above, it is apparent that claims 1-27 define patentable subject matter when the cited references are properly considered for what they actually disclose in their entirety.

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Accordingly, reversal of the rejections of these claims under 35 U.S.C. § 103(a) is respectfully solicited.

Respectfully submitted,

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Appendix of Claims (37 C.F.R. § 41.37(c))

1. A roof structure for covering a roof substrate, comprising:
 - a roof substrate having a sloped upper surface;
 - a waterproof membrane having an upper side and a lower side that is substantially free of fleece material;
 - a moisture curing substantially non-volatile adhesive comprising a silyl-terminated polymer disposed on at least a portion of said lower side of said waterproof membrane in contact with said upper surface of said roof substrate and bonding said waterproof membrane to said roof substrate to define a portion of a low slope roof of a building structure, wherein the adhesive has sufficient viscosity to form beads on the sloped roof substrate upon extrusion of the adhesive onto the sloped upper surface of the roof substrate.
2. The roof structure of claim 1, wherein:
 - said silyl-terminated polymer comprises a silyl-terminated polyether.
3. The roof structure of claim 1, wherein:
 - said waterproof membrane comprises a layer of PVC material.
4. The roof structure of claim 1, wherein:
 - said waterproof membrane comprises a layer of EPDM rubber.
5. A roof deck structure, comprising:

a rigid low slope roof structure adapted to be supported at least in part by the walls of a building, said low slope roof structure having a roof substrate defining a sloped upper surface;

a waterproof membrane having an upper side and a lower side;

a moisture curing silyl-terminated polymer based adhesive disposed on at least a portion of said lower side in contact with said upper surface of said roof substrate, and bonding said waterproof membrane to said upper surface of said roof substrate, wherein the adhesive has sufficient viscosity to form beads on the sloped roof substrate upon extrusion of the adhesive onto the sloped upper surface of the roof substrate.

6. The roof deck structure of claim 5, wherein:

said polymer comprises a silyl-terminated polyether.

7. The roof structure of claim 5, wherein:

said waterproof membrane comprises a layer of EPDM rubber that does not include fleece backing material.

8. A roof deck structure, comprising:

a rigid low slope roof structure including a roof substrate having a sloped upper surface;

a waterproof flexible membrane covering said roof substrate, and defining a lower surface;

a moisture curing substantially non-volatile adhesive comprising a silyl-terminated polymer in contact with the upper surface of the roof substrate and the lower surface of the flexible membrane to thereby bond the flexible membrane to the roof substrate.

9. The roof deck structure of claim 8, wherein:

the adhesive comprises a silyl-terminated polyether based adhesive.

10. The roof deck structure of claim 9, wherein:

the flexible membrane includes a layer of fleece matting on one side; and wherein:
at least a portion of the adhesive is disposed in the fleece.

11. The roof deck structure of claim 10, wherein:

the flexible membrane comprises a layer EDPM rubber having a thickness of about 0.040-0.070 inches thick.

12. The roof deck structure of claim 11, wherein:

the fleece matting has a thickness of about 0.040-0.080 inches.

13. The roof deck structure of claim 8, wherein:

the flexible membrane is bonded to the roof substrate and has a bond strength of at least one hundred sixty-five pounds per square foot.

14. The roof deck structure of claim 13, wherein:
the adhesive has a viscosity prior to curing of about 200,000 to 300,000 centipoise.
15. The roof deck structure of claim 8, wherein:
the roof substrate comprises fiberglass reinforced gypsum board.
16. A roof deck structure, comprising:
a rigid low slope roof structure including a roof substrate comprising fiberglass reinforced gypsum board;
a waterproof flexible membrane covering said roof substrate;
a moisture curing substantially non-volatile adhesive disposed between the roof substrate and the flexible membrane to thereby bond the flexible membrane to the roof substrate; and wherein:
the roof deck structure includes a layer of foam insulation below the fiberglass reinforced gypsum board.
17. A roof deck structure, comprising:
a rigid low slope roof structure including foam insulation forming a roof substrate;
a waterproof flexible membrane covering said roof substrate;
a moisture curing substantially non-volatile adhesive disposed between the roof substrate and the flexible membrane to thereby bond the flexible membrane to the roof substrate;

a fluted steel deck below the foam insulation; and

moisture curing adhesive bonding the foam insulation to the steel deck without the use of mechanical fasteners.

18. The roof deck structure of claim 17, including:

moisture curing adhesive bonding the foam insulation to the steel deck.

19. The roof deck structure of claim 18, wherein:

the adhesive includes a silyl-terminated polymer.

20. The roof deck structure of claim 18, wherein:

the adhesive includes an oxyalkylene polymer having at least one reactive silyl group at each end of the polymer molecule.

21. A roof deck structure, comprising:

a fluted steel deck having a plurality of elongated upper deck surfaces;

a substantially rigid panel disposed on the steel deck, the panel defining upper and lower surfaces;

moisture-curing adhesive disposed between the steel deck and the substantially rigid panel in contact with the upper deck surfaces and the lower surface of the substantially rigid panel; and

a flexible waterproof membrane disposed above the substantially rigid panel.

22. The roof deck structure of claim 21, wherein:
the substantially rigid panel comprises insulation board.
23. The roof deck structure of claim 22, including:
a layer of fiberglass reinforced gypsum board disposed between the insulation board
and the waterproof membrane.
24. The roof deck structure of claim 23, including:
moisture curing adhesive adhesively securing the fiberglass reinforced gypsum board to
the insulation board.
25. The roof deck structure of claim 23, including:
moisture curing adhesive securing the waterproof membrane to the fiberglass reinforce
gypsum board.
26. The roof deck structure of claim 21, wherein:
the waterproof membrane comprises a fleece-backed material.
27. The roof deck structure of claim 21, wherein:
the waterproof membrane comprises a fleece-backed PVC material.

Evidence Appendix (37 C.F.R. § 41.37(c))

None.

Related Proceedings Appendix (37 C.F.R. § 41.37(c))

None.